Remarks

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and the following remarks. Claims 1-21 are pending in the application. Claims 1-21 are rejected. Claims 1, 10, 14, 18,and 20 are independent. Claims 1, 6, 10, 12, 14, 15, 17, 18, and 20 are amended. Claims 3 and 4 are canceled.

Request Information Disclosure Statement be Considered

Applicants note that the Action does not include an initialed copy of the Form 1449 which accompanied an Information Disclosure Statement filed on June 9, 2005. Applicants request the Examiner provide an initialed copy of the Form 1449.

Cited Art

The Action cites US Patent No. 6,654,503 to Sudharsanan *et al.* ("Sudharsanan,") US Publication Number 2003/0039396 to Irvine *et al.* ("Irvine,") US Patent No. 6,317,520 to Passaggio *et al.* ("Passagio",) and US Patent No. 6,101,282 to Hirabayashi *et al.* ("Hirabayashi.")

Claim Objection

Claim 6 is objected to under 37 C.F.R. § 1.75(a) for allegedly failing to particularly point out and distinctly claim the subject matter which Applicant regards as his invention or discovery. Claim 6 has been amended to recite:

> determining whether application of the selected DPCM prediction mode to the block portion produces all zero valued DPCM residuals; and
> if so, encoding ~~an indication that the block portion is flat instead of~~ the block portion without entropy encoding DPCM residuals of the block portion.

Support is found in the Specification at, for example page 10 lines 1-14. Claim 6 is now in condition for allowance. Applicant respectfully requests withdrawal of the § 1.75(a) rejection and allowance of claim 6.

Claim Rejections under 35 U.S.C. § 101

The Action rejects claims 1 and 10-17 under 35 U.S.C. § 101 as allegedly directed toward non-statutory subject matter. Applicant respectfully traverses this rejection.

Claim 1 has been amended to recite "outputting the encoded DPCM residuals of the block portion in a bitstream." Claim 1 as amended now produces a useful, concrete, and tangible result, specifically data in a bitstream. Claim 1 as amended is now allowable under § 101 and Applicant respectfully requests such action.

Independent claim 10 has been amended to recite "a computer-implemented media system providing predictive lossless coding of image or video media content, the system comprising a computer comprising one or more computer-readable storage media," and independent claim 14 recites "a computer-readable storage medium." The claims as recited, including their respective dependent claims 11-13 and 15-17, are now statutory and should be in condition for allowance. Moreover, the words "communication media" are removed in the foregoing amendment from the paragraph at page 14, line 17. The rejected claims therefore should pass muster under § 101.

Claim Rejections under 35 U.S.C. § 102

The Action rejects claim 1 under 35 U.S.C. § 102(e) as being anticipated by Sudharsanan. Applicant traverses and respectfully submits the claims are allowable over the cited art. For a 102(e) rejection to be proper, the cited art must show each and every element as set forth in a claim. (*See* MPEP § 2131.01.) However, the cited art does not describe each and every element. Accordingly, Applicant requests that the rejection be withdrawn.

Claim 1 recites a method for lossless coding of image and video media, comprising in part:

> for an individual one of the block portions, selecting one of multiple available differential pulse code modulation (DPCM) prediction modes to apply to the block portion that out of the available DPCM prediction modes yields a closer to optimal two-sided, zero-biased symbol distribution of a run-length, Golomb-Rice entropy encoder.

Sudharsanan does not teach or suggest the above recited language of claim 1. Specifically, Sudharsanan does not teach or suggest the recited selection from among available DPCM modes that which produces an optimal two-sided, zero-biased symbol distribution of a run-length, Golomb-Rice entropy encoder for a given block of data.

Sudharsanan states, "[p]rediction residuals . . . are mapped to a **non-negative** integer scale and are coded using a new-entropy-coded mechanism based on a **modified Golomb Code**

(MGC.)" (Sudharsanan, 2:8-12.) Sudharsanan continues to describe "[a] suitable 1-1 mapping of the positive integers and the negative integers in the pixel value range onto a single segment **of the positive integers**." (Sudharsanan, 5:64-67, emphasis added. *See generally*, 5:64-6:35.)

Because Sudharsanan specifically describes mapping to a non-negative integer scale, and then entropy encoding based on a modified Golomb Code, Sudharsanan can not and does not teach or suggest "selecting one of multiple available differential pulse code modulation (DPCM) prediction modes to apply to the block portion that out of the available DPCM prediction modes yields a closer to optimal two-sided, zero-biased symbol distribution of a run-length, Golomb-Rice entropy encoder" as recited in claim 1. Claim 1 is therefore allowable over Sudharsanan. Applicant respectfully requests withdrawal of the § 102 rejection and allowance of claim 1.

Claim Rejections under 35 U.S.C. § 103

Claims 2-6, 9, and 14-21 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Sudharsanan in view of Irvine. Claims 7 and 8 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Sudharsanan in view of Passaggio. Claims 10-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sudharsanan in view of Irvine and further in view of Hirabayashi. Applicant respectfully traverses.

Dependent Claims 2, 5, 6, and 9 are Allowable Over Sudharsanan in View of Irvine

As described above, claim 1, from which dependent claims 2, 5, 6, and 9 depend, is allowable over Sudharsanan because Sudharsanan does not teach or suggest the recited selection from among available DPCM modes that which produces a closer to optimal two-sided, zero-biased symbol distribution of a run-length, Golomb-Rice entropy encoder for a given block of data. Irvine does not cure this deficiency in claim 1.

Regardless of whether Irvine describes RLGR encoding of residuals, it is impermissible to combine Irvine with Sudharsanan to cure this deficiency in Sudharsanan because it would change the principle of operation of Sudharsanan. ("If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious." MPEP § 2143.01(VI).) Because Sudharsanan explicitly describes mapping to a non-negative integer scale and then entropy coding based on a modified Golomb Code, as described above,

modifying Sudharsanan to encode with RLGR encoding would change the principle of operation of Sudharsanan.

Applicant additionally notes that Sudharsanan states, "Golomb codes can only be optimal for certain probability distributions. To alleviate this, an MGC technique was developed in a prior patent application . . ." (Sudharsanan, 8:32-35.) Thus, Sudharsanan explicitly teaches **away** from the use of Golomb encoding, thus making the combination of Irvine with Sudharsanan an impermissible combination of references under MPEP § 2145(X)(D)(2) (" References Cannot Be Combined Where Reference Teaches Away from Their Combination.")

Thus, Irvine does not cure the above cited deficiencies of Sudharsanan with respect to claim 1 because it is impermissible to combine Irvine with Sudharsanan. Claim 1 is therefore allowable over Sudharsanan and Irvine. Dependent claims 2, 5, 6, and 9 are likewise allowable at least because they depend from claim 1. Applicant respectfully requests withdrawal of the § 103(a) rejection and allowance of dependent claims 2, 5, 6, and 9.

Claims 10-13 Are Allowable Over Sudharsanan in View of Irvine and Hirabayashi

Independent claim 10 recites, in part, "a multi-mode differential pulse code modulation (DPCM) process operating on an individual macro-block of the input image data to choose one of multiple DPCM prediction modes that produces a residual distribution for the macro-block to more closely match an optimal two-sided, zero-biased, run-length, Golomb-Rice (RLGR) entropy coding distribution, and applies the chosen DPCM prediction mode to the macro block."

As described above, Sudharsanan does not teach or suggest the above recited language of independent claim 10. Specifically, because Sudharsanan specifically describes mapping to a non-negative integer scale and then entropy coding based on a modified Golomb Code, as described above, Sudharsanan can not and does not teach or suggest a "choos[ing] one of multiple DPCM prediction modes that produces a residual distribution for the macro-block to more closely match an optimal two-sided, zero-biased, run-length, Golomb-Rice (RLGR) entropy coding distribution" as recited in independent claim 10.

Irvine does not cure the above recited deficiencies of Sudharsanan with respect to independent claim 10 because it is impermissible to combine Irvine with Sudharsanan as described above. Specifically, combining Irvine with Sudharsanan would change the principle of operation of Sudharsanan, which is impermissible under MPEP § 2143.01(VI). Additionally,

Sudharsanan specifically teaches away from the use of Golomb encoding, thus making the combination of Irvine with Sudharsanan an impermissible combination of references under MPEP § 2145(X)(D)(2).

Hirabayashi does not cure the deficiencies of Sudharsanan and Irvine with respect to independent claim 10. Specifically, Hirabayashi does not teach or suggest the language recited above. Hirabayashi describes:

> The difference generating circuit 102 generates, for each of the 8x8 pixels in the block, the difference from a pixel adjacent to the left, and stores thus generated 8x8 differences in the buffer 112. Similarly, the difference generating circuit 103 generates, for each of the 8x8 pixels in the block, the difference from a pixel positioned thereon, and stores thus generated 8x8 differences in the buffer.
>
> The Huffman encoder 104 effects Huffman encoding of the difference data trains stored in the buffers 112, 113 according to predetermined Huffman tables, for output to the respectively different signal lines. The code amount comparator 105 compares the amounts of codes of the two Huffman encoded data trains released from the Huffman encoder 104 by each block, and releases "0" in case the amount of the Huffman encoded data released from the difference generating circuit 102, or the amount of the Huffman encoded data of the block when the differences are calculated with the pixels at the left, is less than the other, or releases "1" in case the amount of the Huffman encoded data released from the difference generating circuit 103, or the amount of the Huffman encoded data of the block when the differences are calculated with the pixels positioned above.
>
> . . .
>
> The selector 108 releases the difference data train stored in the buffer 112 or 113 respectively if the output of the code amount comparator 105 is "0" or "1". (Hirabayashi, 9:19-47.)

Thus, to the extent that Hirabayashi describes selecting a prediction or encoding mode, Hirabayashi is simply indicating whether one set of Huffman encoding results is less than another. This is not the same as, and does not teach or suggest, the recited language of independent claim 10 wherein one of multiple DPCM prediction modes is chosen to "more closely match an optimal two-sided, zero-biased, run-length, Golomb-Rice (RLGR) entropy coding distribution."

Because Sudharsanan, Irvine, and Hirabayashi, whether considered separately or in combination with each other, do not teach or suggest each and every element of independent claim 10, independent claim 10 is allowable. Dependent claims 11-13 are allowable at least

because they depend from independent claim 10. Applicant respectfully requests withdrawal of the § 103(a) rejections and allowance of claims 10-13.

Claims 14-17 are Allowable Over Sudharsanan in View of Irvine

Claim 14 recites a computer-readable storage medium having computer-executable program instructions stored thereon, operative upon execution in a computer media processing system to perform a method of encoding image or video data, the method comprising, in part:

> for a macro-block of the image data, determining which from a group of available DPCM prediction modes produces residuals closest to an optimal two-sided, zero-biased distribution for RLGR coding.

As described above, Sudharsanan does not teach or suggest "determining which from a group of available DPCM prediction modes produces residuals closest to an optimal two-sided, zero-biased distribution for RLGR coding" as recited in independent claim 14. Specifically, because Sudharsanan specifically describes mapping to a non-negative integer scale and then entropy coding based on a modified Golomb Code, as described above, Sudharsanan can not and does not teach or suggest "determining which from a group of available DPCM prediction modes produces residuals closest to an optimal two-sided, zero-biased distribution for RLGR encoding" as recited in independent claim 14.

Irvine does not cure the above recited deficiencies of Sudharsanan with respect to independent claim 14 because it is impermissible to combine Irvine with Sudharsanan as described above. Specifically, combining Irvine with Sudharsanan would change the principle of operation of Sudharsanan, which is impermissible under MPEP § 2143.01(VI). Additionally, Sudharsanan specifically teaches away from the use of Golomb encoding, thus making the combination of Irvine with Sudharsanan an impermissible combination of references under MPEP § 2145(X)(D)(2).

Because Sudharsanan and Irvine do not teach or suggest each and every element of independent claim 14, independent claim 14 is allowable. Dependent claims 15-17 are allowable at least because they depend from independent claim 14. Applicant respectfully requests withdrawal of the § 103(a) rejection and allowance of claims 14-17.

Claims 18-21 are Allowable Over Sudharsanan in View of Irvine

Independent claim 18 recites a method of decoding predictive losslessly coded data of an image or video, comprising in part:

> otherwise, where the DPCM prediction mode of the macro-block is a no DPCM prediction mode because application of possible DPCM prediction modes did not yield a symbol distribution for RLGR entropy encoding sufficiently close to an optimal symbol distribution for RLGR entropy encoding such that the symbol distribution meets a sufficiency threshold, decoding the macro-block's pixels without DPCM demodulation.

Independent claim 20 recites a predictive-lossless coded image or video decoder, comprising, in part:

> otherwise, where the macro-block was not encoded using a DPCM prediction mode because application of possible DPCM prediction modes did not yield a symbol distribution for RLGR entropy encoding sufficiently close to an optimal symbol distribution for RLGR entropy encoding such that the symbol distribution meets a sufficiency threshold, decoding the macro-block without DPCM demodulation.

Neither Sudharsanan nor Irvine teach or suggest the above recited language of independent claims 18 and 20. Specifically, neither Sudharsanan nor Irvine teach or suggest "because application of possible DPCM prediction modes did not yield a symbol distribution for RLGR entropy encoding sufficiently close to an optimal symbol distribution for RLGR entropy encoding such that the symbol distribution meets a sufficiency threshold."

The Action states at page 16 with regard to dependent claim 7 that "Sudharsanan does not specifically disclose wherein the selecting the DPCM prediction mode comprises: determining whether the DPCM prediction mode yielding the closer to optimal symbol distribution for entropy coding is sufficiently close to the optimal symbol distribution for entropy coding and if not sufficiently close, applying no DPCM to the macro-block before the entropy encoding." Applicant agrees. Applicant further notes that Irvine does not cure this deficiency in Sudharsanan. Thus, independent claims 18 and 20 are allowable over Sudharsanan and Irvine.

The Action, however, alleges that Passaggio cures the deficiencies of Sudharsanan with respect to claim 7. Because independent claims 18 and 20 incorporate similar language to that of dependent claim 7, Applicant addresses a possible rejection of independent claims 18 and 20 based upon Passaggio in the interest of expediency.

Support for the above recited language can be found in the Specification at, for example, page 9, lines 17-28, which states:

> The DPCM modulator tests each of the DPCM prediction modes 1 through 7 (i.e., other than the no DPCM mode, which is mode 0) so as to choose which DPCM mode produces more compressible DPCM residuals. The DPCM modulator applies the respective DPCM modes and checks the symbol distribution of the resulting residuals. The DPCM modulator then checks which prediction mode produced residuals having a distribution closest to the ideal distribution for RLGR entropy encoding. The DPCM modulator further checks whether this closest distribution is sufficiently close to the ideal zero-biased, two-sided Laplacian distribution. The DPCM modulator chooses the DPCM prediction mode with the closest-to-ideal distribution for the macro block, unless the sufficiency threshold is not met. Otherwise, if the DPCM prediction mode with the closest-to-ideal distribution does not meet the sufficiency threshold, then the DPCM modulator chooses the no DPCM mode (mode 0) as a default.

Regardless of whether Passaggio describes DPCM prediction, at no point does Passaggio teach or suggest the above recited language of independent claims 18 and 20. The Action alleges that Figures 7a and 7b of Passaggio suggests the recited elements of independent claims 18 and 20. Applicant respectfully disagrees. Passaggio states:

> This is, for example, the case for the spatial correlation within one frame of the image sequence, and for an ordinary audio stream. . . .
>
> If one wants to code the sequence by applying a Bit-Plane Coding technique, . . . a table of the type shown in FIG. 7a can be designed in order to maximize the compression ratio. . . .
>
> If s'(i) is a good prediction, the pair (s(i), s'(i)) is strongly peaked around the main diagonal s(i)=s'(i), with a decreasing probability for the sub-diagonals. This is also the case in the example where s'(i)=s(i-1). In order to minimize the total number of ones, the code values having the smallest number of ones in their binary representation are placed closest to the diagonal.
>
> An example of a possible table is shown in FIG. 7a. The corresponding number of ones [after application of the table] is shown in the table of FIG. 7b. (Passagio, 6:28-50.)

Thus, Passaggio actually describes application of a table (shown in FIG. 7a) and the results of application of the table (shown in FIG. 7b) to a sequence. This is different from, and does not teach or suggest, the above recited language of independent claims 18 and 20 where no DPCM prediction mode is applied to the macro-block if a sufficiency threshold is not met for the symbol distribution. Applicant further notes that at no point does Passaggio teach, suggest, or even mention a sufficiency threshold as recited in independent claims 18 and 20.

Because Sudharsanan, Irvine, and Passaggio, whether considered separately or in combination with each other, do not teach or suggest each and every element of independent claims 18 and 20, independent claims 18 and 20 are allowable. Dependent claims 19 and 21 are allowable at least because they depend from independent claims 18 and 20, respectively. Applicant respectfully requests withdrawal of the § 103(a) rejections and allowance of claims 18-21.

Dependent Claims 7 and 8 are Allowable Over Sudharsanan in View of Passaggio

As described above, claim 1, from which dependent claims 7 and 8 depend, is allowable over Sudharsanan because Sudharsanan does not teach or suggest the recited selection from among available DPCM modes that which produces an optimal two-sided, zero-biased symbol distribution of a run-length, Golomb-Rice entropy encoder for a given block of data. Passaggio does not cure this deficiency in claim 1.

Regardless of whether Passaggio describes DPCM encoding of residuals, Passaggio does not cure the deficiencies of Sudharsanan with respect to claim 1 because at no point does Passaggio even mention, much less teach or suggest, the above recited language of claim 1 wherein one of multiple available differential pulse code modulation (DPCM) prediction modes that out of the available DPCM prediction modes yields a closer to optimal two-sided, zero-biased symbol distribution of a run-length, Golomb-Rice entropy encoder is selected to apply to a block portion.

Thus, because Sudharsanan and Passaggio, whether considered separately or in combination with each other, do not teach or suggest each and every element of claim 1, claim 1 is allowable. Dependent claims 7 and 8 are allowable at least because they depend from claim 1. Applicant respectfully requests withdrawal of the § 103(a) rejections and allowance of dependent claims 7 and 8.

Conclusion

The claims in their present form are allowable. Such action is respectfully requested.

Respectfully submitted,

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